POLICY RESEARCH WORKING PAPER 1667

Dealing with Commodity Price Uncertainty

Panos Varangis
Don Larson

Market liberalization has increased the appeal of commodity derivative instruments (such as futures, options, swaps, and commodity-linked notes) as a means of managing price uncertainty. In many emerging countries both government and the private sector are increasingly using these instruments.

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Summary findings

Liberalization in commodity markets has brought profound changes in the way price risks are allocated and managed in commodity subsectors. Price risks are increasingly allocated to private traders and farmers rather than absorbed by the government.

The success of market reform depends on the ability of the emerging private sector to make full use of the available range of modern commodity marketing, price risk management (such as futures, options, swaps, commodity bonds, and so on), and financing instruments.

Because farmers do not generally have direct access to these instruments, intermediaries must be developed. Larger private traders and banks are in the best position to become these intermediaries.

Preconditions needed for accessing modern commodity marketing, price risk management, and financing instruments are:

- Creating an appropriate legal, regulatory, and institutional framework.
- Reducing government intervention that crowds out private sector involvement.
- Providing training and raising awareness.
- Improving creditworthiness and reducing performance risk.

The use of commodity derivative instruments to hedge commodity price risk is not new among developing countries. The private sector in many Asian and Latin American countries, for example, have been using commodity futures and options for some time. More recently, commodity derivative instruments are being used increasingly in several African countries and many economies in transition. And several developing and transition economies have sought to establish commodity derivative exchanges.

This paper — a product of the Commodity Policy and Analysis Unit, International Economics Department — is part of a larger effort in the department to investigate alternative price risk management and finance systems under market liberalization. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Jean Jacobson, room N5-032, telephone 202-473-3710, fax 202-522-3564, Internet address jjacobson@worldbank.org. October 1996. (44 pages)

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Commodity Policy and Analysis Unit
International Economics Department
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Summary

Many developing countries and transition economies rely heavily on exports of primary commodities for income and export revenues, which exposes both governments and the private sector in these countries to the uncertainty associated with commodity price movements. Government revenues can be dependent on commodity prices either directly, through export taxes or import duties or indirectly, through income and expenditure taxes. Price support programs also expose governments to commodity price risks, since governments generally absorb the cost of falling prices. Likewise, in the private sector, commodity traders' profits are uncertain because of price variability; and farmers' decisions to plant, harvest, and invest also depend largely on the outcome of future prices.

There are three classes of instruments to deal with commodity price uncertainty: instruments aimed at making the commodity price distribution less variable; instruments that make commodity prices, and possibly commodity-related revenues, more predictable; and instruments that keep expenditures in line with income flows. Government price support programs and international commodity agreements (ICA) are examples of tools used to reduce price variability. Commodity derivative markets such as futures, options, swaps, and commodity-linked notes are tools for hedging, to make revenues more predictable. Finally, compensatory financing schemes, such as the IMF Contingency Compensatory Finance Facility and EU's Stabex scheme, as well as credit markets and savings decisions, tend to smooth consumption expenditures.

Making Price Distribution Less Variable

In general, ICAs and government support programs (commodity stabilization funds, buffer stocks, etc.) attempt to make the distribution of commodity prices less variable. In most cases the intervention also tries to raise the mean price distribution above market levels. However, such interventions tend to be inflexible, leading to a misallocation of resources. They also have by and large been costly and not very effective. Prices are subject to long and unpredictable swings, requiring large resources to support them. This carries a high financial cost in terms of foregone opportunities, with most of the costs borne by farmers and government treasuries.

There are no ICAs currently in force, and when they were, their efficacy was questionable. Their unsatisfactory performance had to do with conflicting interests between producing and consuming members, inadequate financial resources, failure to account for changes in production and consumption patterns, and failure to adjust unrealistic price goals in the face of persistent price declines during the 1980s and into the 1990s.

Smoothing Income Flows

Compensatory financing schemes have the objective of providing resources to compensate for short-term declines in commodity-related revenues. However, by their very nature, they tend to react to ex-post developments in commodity markets rather than provide an instrument for ex-ante price risk management. They are also subject to conditionality.

Making Prices and Revenues More Predictable

Commodity derivative instruments have several advantages over government intervention in dealing with commodity price uncertainty: (i) they rely on market-determined prices instead of administratively-determined prices; (ii) they shift risk to entities better able and willing to assume risks; (iii) they can be linked to financing instruments, in some cases making financing feasible at lower cost; and (iv) in most cases, they cost less than government price intervention programs.

Commodity derivative instruments can be combined with traditional financial tools to enhance financing. This is especially important for recently liberalized commodity subsectors, where the quick establishment of credit flows is crucial to the success of reform. There are many ways to link hedging and traditional financial tools. For example, an exporter and a buyer may agree on a fixed price for a certain volume of a commodity. The buyer then provides a line of credit to the exporter, which is drawn down as exports are made. In turn, the buyer sells the commodity for future delivery or hedges the price risk on the option market. Commodity-related projects can also benefit from using commodity derivatives along with financing tools. For example, the repayment of a loan to a copper producer can be linked to copper prices; if prices fall (increase) the producer pays less (more) interest.

It should be noted, however, that commodity derivative instruments do not have exactly the same objectives as government price support programs and ICAs. Commodity derivative instruments are designed to reduce commodity price and revenue uncertainty. They can also provide some price stability, but for relatively short periods of time (usually less than a year). Such investments are not usually effective in stabilizing prices for longer periods, and they cannot maintain higher (for sellers) or lower (for buyers) than market prices.

Commodity derivative instruments are not new in developing countries and transition economies. Private sector exporters and traders in several commodity-dependent countries such as Brazil, Colombia, Costa Rica, El Salvador, Indonesia, and Malaysia have been using commodity futures and options to hedge their price exposure. Certain government companies (parastatals), mainly in metals and energy, have also been using commodity derivatives markets; among them are Codelco (copper in Chile), PMI (oil in Mexico), Petrobras (oil in Brazil), Petroecuador (oil in Ecuador), and Mexicana de Cobre (copper in Mexico). In addition, governments have recently started using

commodity derivatives as an alternative to their commodity intervention programs. Among these are the USDA options pilot program, the Canadian cattle options pilot projects and Mexico's price support program for cotton and grains. Reforms aimed at liberalizing agricultural markets, reducing government interventions, and removing capital, foreign exchange and legal controls and barriers are inducing the private sector and governments alike to hedge their price risks.

As a result of the increasing popularity of commodity derivative markets several developing countries and transition economies have expressed an interest in setting up their own commodity exchanges in order to provide local users with better access to contract exchanges, to ensure that contract specifications are appropriate for locally traded commodities, to introduce new contracts of local interest, and to remove the exchange rate risk of using foreign exchanges. These benefits, however, have to be weighted against the benefits of using existing exchanges with well-established rules and regulations, have the confidence of their customers and a high volume of transactions (liquidity), enabling users to easily find a buyer or seller. There are several preconditions for establishing new futures and options exchanges in developing countries and transition economies, the most important being a well- established cash (spot) market. Others include appropriate infrastructure, a developed financial sector, an appropriate legal and regulatory framework, sufficient capital to form a viable clearinghouse, and the support and interest of the local business community in using the exchange. Several developing countries and transition economies, including Argentina, Brazil, China, Hungary, India, Malaysia, the Philippines, Russia, and Zimbabwe have already established futures and options exchanges.

Whether establishing their own or using existing commodity derivative markets, developing countries and transition economies need to overcome certain barriers to using these markets:

- ***Legal and regulatory barriers.*** Some countries have exchange controls and/or regulations that prohibit the purchase and sale of commodity derivative instruments.
- ***Policy barriers and government intervention.*** Government policies that distort commodity markets crowd out private sector incentives for managing commodity price risks.
- ***Know-how***. The use of commodity derivative markets requires considerable knowledge and the existence of an appropriate institutional framework within which to carry out hedging operations. Hedging requires special attention from the user of commodity derivatives, it requires personnel to follow the positions in commodity markets as well as a system of controls to avoid abuses.
- ***Awareness.*** Policymakers, decisionmakers, CEOs, board of directors, etc., need to have an adequate general understanding of market techniques and instruments.
- ***Basis risk and liquidity.*** In commodity derivative markets there are not always exact hedging instruments available for every commodity. The length of time and volume of transactions that can be hedged is also constrained. Derivative instruments

(forward contracts, options, swaps, etc.) traded in the over-the-counter (OTC) could, in certain cases, provide a more exact hedging instrument, since OTC instruments can be customized. However, even OTC instruments have limitations with regard to the hedging time and the volume of transactions they can cover. Exceeding these limits can prove very costly for the user of such instruments.

- ***Creditworthiness.*** The use of commodity derivative instruments, particularly contracts, swaps, commodity bonds and commodity-linked loans, usually requires a high credit rating. This is particularly true for forward contracts, swaps, commodity bonds and commodity-linked loans. Countries can overcome the creditworthiness constraints by improving collateralization and insurability through clarification of collateral law and property rights, central bank regulations for using foreign exchange to hedge transactions, use of offshore accounts, and the creation of secure collateral in the form of warehouse receipts backed by appropriate monitoring, licensing, and bonding systems with international standards.
- ***Premiums and cash flows.*** The use of futures requires the deposit of margins, and the purchase of options requires the payment of a premium. Other commodity derivative instruments also require the use of capital for purchasing that instrument or for using collateral to cover performance risk. Both governments and firms need to have resources available to meet these needs.

1. Why Deal with Price Uncertainty?

It is clear that better management of commodity price risk could benefit the great majority of developing countries, which continue to have large commodity price exposures on both exports and imports. Exports are often concentrated in a few primary commodities with positively correlated price movements. For 36 developing countries, the share of primary commodities to total exports exceeded 50 percent during the early 1990s. In several, a single commodity accounts for more than 80 percent of total export earnings; for example, coffee in Burundi, Burkina Faso and Uganda, and oil in Nigeria, Venezuela and Iran. Overall, primary commodities accounted for 68 percent of exports of low-income developing countries and 44 percent of high-income developing countries. Although the dependency of developing countries on primary commodities exports has declined during the past 20-30 years, it is still quite high. Imports are also influenced by commodity prices, particularly those of fuels and food. Oil and food grains account for a large share of the import bill for a large number of developing countries, particularly the low-income group. Given the crucial role of oil and food grains in these countries, the issue of managing commodity price uncertainty becomes critical.

The dependency on few commodities and uncertain commodity prices expose both the government and the private sector in these countries to uncertain revenues and expenditures, which makes planning difficult. For example, in Venezuela, where oil-related revenues accounted for 78.5 percent of total government revenues in 1991, 10 percent change in oil prices meant a 6 percent change in total government revenues. The servicing of a country's debt is also crucially dependent on commodity prices. For example, in Indonesia, the ratio of debt service to exports rose from 8.2 percent in 1981 to 27.8 percent in 1987, due mainly to the dollar depreciation after 1985 and the fall in oil prices after 1986.

Private exporters and traders, often operating under tight margins, can also face significant difficulties when commodity prices change. For example, an exporter or trader that has purchased coffee from a local producer and has not yet sold it faces enormous risk if coffee prices collapse. In the absence of ways to manage price uncertainty, traders require large margins to avoid these negative consequences. Uncertainty in commodity prices also has negative implications for commodity financing; banks and other lending institutions are reluctant to finance commodity trade or commodity-related projects because the repayment of loans often depends on future commodity prices. A fall in commodity prices may affect the borrower's ability to repay the loan, and in any case, the cost of lending may be high.

2. Categories of Instruments to Manage Price Uncertainty

The most common approaches used by developing countries' to manage commodity price risk include domestic and international commodity price stabilization schemes, reserve management and contingent finance. Domestic commodity price stabilization schemes most often involve the creation of a buffer stock that purchases commodities when prices fall below a certain threshold and sells when prices recover. Another instrument is a stabilization fund that compensates producers when prices fall and accumulates reserves when prices increase (example, Caisse de Stabilization in Cote d'Ivoire). Commodity stabilization schemes often impose a high cost on the economy in terms of funds required; and they often prove ineffective when most needed. In developing countries in particular, domestic price stabilization has not been satisfactory, with the vast majority of such funds being used for social objectives unrelated to price stabilization, experiencing severe liquidity problems, and/or being subject to mismanagement and corruption. But if they were to be used for their stated objectives, commodity stabilization schemes would still not be effective because of the way commodity prices typically behave.

Recent empirical work on commodity prices (Deaton 1992) shows that most commodity prices do revert eventually to their mean—a requirement for a stabilization fund (or a buffer stock scheme) to be viable—but only very slowly, with an average reversal time measured in years, not months. Because of this, a commodity stabilization fund has to be very large to be effective or the country needs to have ample access to foreign borrowing. But a large fund is not feasible for domestic political reasons—it is too much subject to spending pressures from domestic constituencies—and sovereign risk generally prohibits the necessary access to foreign borrowing. And because a small fund is not effective, there is little scope for countries to stabilize domestic commodity prices through foreign borrowing when the fund's resources run out. Furthermore, funds tie up scarce resources that could be better used in other sectors of the economy. An additional problem with domestic price stabilization schemes is that they redistribute the risks within the country (usually from producers to the government) rather than diversify them outside the country to entities better able to bear such risks.

A significant part of the cost of price stabilization in agricultural commodities has been borne by the farmers. Farmers in commodity stabilization systems usually receive a low percentage of the FOB price compared to farmers in free market systems. For example, cocoa farmers in Cote d'Ivoire and Ghana receive less than 50 percent of the FOB price compared to cocoa farmers in Nigeria, Indonesia and Malaysia, who receive over 80 percent.

Given the problems associated with stabilization funds and other traditional instruments, many countries that once relied on these instruments for their export crops have been abandoning them. Nigeria did away with stabilization in the cocoa sector in 1986; Madagascar, Burundi and Uganda did so in the coffee sector in 1989, 1990, and 1992, respectively, and Cameroon did so for coffee and cocoa in 1994. Stabilization

funds that have had some success are the coffee fund in Colombia (although the decline of coffee prices after 1989 created serious financial problems for the fund), the Copper Stabilization Fund in Chile, and the Mineral Resource Stabilization Fund in PNG (where, the prolonged decline in commodities in the 1980s also caused significant financial problems). In general, however, government intervention to stabilize commodity prices and reduce uncertainty has often proven ineffective and costly. The stabilization funds in Chile and PNG were to stabilize commodity related revenues instead of prices.

On a microeconomic level, firms frequently allocate an amount of capital as a buffer against lower-than-expected revenues or higher-than-expected costs. This capital may come from cash reserves, sale of liquid assets, issues of debt or equity, deferral of capital investment, or cutbacks elsewhere in the firm. This allocation of capital insurance against risks is similar to the use of a stabilization fund at the macroeconomic level. In both cases, governments and private or public firms allocate capital as a form of insurance. The cost of this insurance is the foregone income that the capital could earn if applied to its most productive use. If capital is dedicated as a safety cushion instead of invested, it saves the firm or the government the cost of hedging, but costs it the foregone investment return. Self-insurance is free only if there is no better use for the capital.

International commodity stabilization schemes are agreements aiming at raising and stabilizing commodity prices. The main instruments employed by these agreements are stocks and export quotas. Commodity agreements in the late 1970s and 1980s included the International Coffee Agreement, which used an export quota system, and the International Cocoa Agreement and the International Rubber Agreement, which used buffer stocks. Currently, no agreements remain with price stabilization components. These agreements ran into difficulties because they tried to maintain not only stable but also high prices, because of disagreements among members, and because of lack of discipline.

Compensatory financing schemes can perform a useful role by providing funds after a price decline. However, by their very nature they are designed to provide financial assistance for the adjustment to external commodity price or volume shocks, rather than provide a tool for ex ante price risk management.

The limited success of this instrument in managing commodity price uncertainty has created the need for other alternatives such as commodity derivatives. These include standardized instruments used in established commodity exchanges (futures and options) and over-the-counter (OTC) alternatives (forward contracts, OTC options, swaps, etc.). The main advantage of the exchange-traded instruments are the low cost of executing transactions, liquidity, and also standardized requirements regarding quality, quantity, delivery dates, etc. OTC instruments are customized to the specific transaction and could reduce the administrative burden of executing transactions for the final user. Annex 1 describes the main characteristics of various commodity derivative instruments.

There are three main reasons to intervene in commodity markets; to make the price distribution less variable; to make commodity prices and/or revenues more predictable, given a price distribution; and, to smooth expenditures, given income flows. International commodity agreements and government policies (stabilization funds, buffer stocks, etc.) aim at the first objective. However, as discussed earlier, in most cases fixing commodity prices for an extended period of time has proven costly and ineffective and not necessarily desirable from an economic point of view, since it impedes the allocation of resources to more dynamic sectors. Commodity derivative instruments aim at the second objective; rather than stabilize prices or revenues they remove price uncertainty from commercial transactions and commodity-related lending, and thereby reduce uncertainty in revenues. For example, using a swap, a mining company can lock in (fix) the price for its copper exports for a period, of say, up to three years. Derivative instruments can also provide price protection for farmers, assuring them of a minimum price for their crop within a given year. The question, however, is for how long and to what degree quantities prices can be stabilized: price coverage can generally last for longer periods in the cases of metals and energy; in energy markets, for example, coverage for certain size transactions can be extended for up to ten years. For agricultural commodities, coverage is usually restricted to a few months because of production uncertainty. Finally, the third objective, smoothing expenditures given income flows, is dealt with merely through credit markets and saving decisions. But also, revenue stabilization funds (e.g. Chile) could be used to stabilize government spending.

Commodity derivative instruments will not prevent or reverse a persistent deterioration in commodity prices, such as occurred after the mid 1980s, or sudden spikes in prices in oil or, more recently, in grains, but they can mitigate the short-term effects of adverse price movements; that is, smooth out short-term price fluctuations. In this sense, commodity derivatives can help governments and the private sector to gradually adjust to new trends in commodity prices. To deal with unfavorable longer-term price trends, developing countries need to improve productivity and continue the process of diversification.

3. The Rise and Fall of Cooperative Strategies

Large market share and low price elasticities not only create an adding-up problem but also entice producers to collectively control supplies and influence prices, particularly where production is concentrated in the hands of a few decisionmakers. Examples include the nineteenth century copper cartel operated by the French Society Industrielle et Commerciale des Metaux and the modern De Beers diamond cartel.

Beginning in the 1950s, many governments of commodity-producing countries took on the task of managing commodity markets through international agreements. Under United Nations auspices five international commodity agreements were signed by producing and consuming countries: the International Sugar Agreement (1954), Tin Agreement (1954), Coffee Agreement (1962), Cocoa Agreement (1972), and Natural Rubber Agreement (1980). These agreements, however, were unable to adapt to changes in the market, and by 1996 the economic clauses in them had all lapsed or failed (Gilbert 1987 and 1995), victims of politics and economics (table 1).

Four important lessons can be drawn from theory and history:

- Using the example of a common export tax, Akiyama and Larson (1994) demonstrate that the benefits to producers are not distributed equally among countries that coordinate their policies. Major producers have often benefited from not joining a commodity agreement. Brazil stayed out of the Tin Agreement, Cote d'Ivoire out of the Third Cocoa Agreement, and Vietnam out of the Coffee Agreement.

- Under several agreements (tin, cocoa, rubber) buffer stock operations were used to influence world prices. Williams and Wright (1991) and Larson and Coleman (1993) show that even random commodity price movements will eventually bankrupt such schemes. Such was the case when the Tin Agreement failed in spectacular fashion in 1985, nearly bringing the London Metals Exchange down with it.

- The agreements are shaped to existing market conditions and so are not sufficiently adaptable to changing markets in a dynamic world. The economic provisions of the Second Sugar Agreement were first suspended in 1962 when Cuba, having lost access to the protected U.S. market, sought a substantial increase in its quota, which the other producers refused to grant (Gilbert 1987). The Third International Cocoa Agreement, negotiated during a period of historically high prices, sought to defend unsustainable price levels.

- The very success of agreements to raise international prices often leads to their eventual demise. Governments negotiate the agreements, but farmers frequently decide how much to produce and how much to invest. Responding to higher

prices, farmers in Brazil, Cote d'Ivoire, Indonesia and Malaysia planted new areas to cocoa during the Cocoa Agreement, swamping an underfinanced buffer stock operation. Similarly, coffee production expanded dramatically in Colombia and Vietnam during the Coffee Agreement, leading to large inventories of unmarketed coffee.

Table 1. Historically, International Commodity Agreements Have Proven Unsustainable

	Sugar	Tin	Coffee	Cocoa	Rubber
Initial agreement date	1954	1954	1962	1972	1980
Status of economic clauses	lapsed in 1963 and 1983	collapsed in 1985	suspended in 1989	suspended in 1988	suspended in 1996
Number of agreements	4	6	4	4	3

Source: Gilbert 1995, and World Bank.

4. Experience of Developing Countries in Using Commodity Derivative Tools

The use of commodity derivative markets by developing countries is not new. Coffee and cocoa traders in some developing countries have used futures and options contracts for the past 10–15 years to hedge their exposure to commodity price risks. Although, as table 2 shows, in 1991 the open interest in US commodity exchanges attributed to developing countries was still very small as a percent of the total open interest, there is a growing acceptance of swaps, options and futures as tools to manage risk and to tap new sources of finance. Among developing countries, the largest share using US futures exchanges is attributed to Latin American countries, possibly due to geographic proximity, destination of trade, and similar trading hours. Similar statistics could not be obtained for exchanges in Europe and Asia. Among commodities, most of the activity of developing countries has been concentrated in foodstuff (mainly coffee and cocoa), metals and energy.

Table 2. Percentage of Reportable Developing Country Open Interest Over Total Open Interest in US Futures Exchanges for Selected Commodities, 1991

Commodity Group	Asia Developing	Middle East and North Africa	Sub-Saharan Africa	Latin America
Grain and soybean complex	0.19	0.12	-	1.21
Livestock products	-	-	-	0.39
Foodstuffs	0.30	0.18	0.68	2.09
Industrial material	-	0.14	0.03	1.58
Metals	0.07	0.90	-	1.19
Crude oil*	-	-	-	1.40
Financial instruments	0.01	0.20	-	2.04
Currencies	-	0.27	-	3.17

Note: The data were compiled from CFTC "01" report forms, which are filed daily by futures commission merchants, clearing members, and foreign brokers. (-) signifies values less than 0.05.
*Total for all developing countries is 1.6 percent.
Source: Summary of data presented in Debatisse and others, 1993

The use of derivative instruments by developing countries has recently been increasing. For example, in energy derivative markets, the open interest of developing countries in crude oil futures contracts on the New York Mercantile Exchange (NYMEX) was 1.6 percent in 1993. During the first quarter of 1994, developing countries accounted for about 3.5 percent of the total open interest in such contracts, with the largest increase registered by Latin America. The International Petroleum Exchange (IPE) in London has also reported a significant increase in the open interest attributed to countries in the FSU and Latin America.

The increasing use of derivative instruments to deal with commodity price uncertainty by developing countries is due mainly to:

- The wave of deregulation and privatization in developing countries, which is making governments and the private sector more responsive to market forces. Governments, rather than providing price protection by absorbing price risks, are increasingly allowing price risks to be incurred and managed by private entities (traders and producers). Certain governments are also considering, and some have used, commodity derivative markets to protect their exposure to price risks when they offer price protection to producers.
- Cuts in farm subsidies and price supports schemes as a result of the Uruguay Round, which have increased uncertainty in agricultural markets. Producers are now increasingly eager to hedge risks.
- Increasing awareness and knowhow regarding derivative instruments among policymakers and the private sector. The proliferation of financial instruments and rapidly growing stock markets has spillover effects on commodity markets.
- The removal of legal barriers and controls, such as foreign exchange and capital controls, so that risk management instruments can be used by the private sector and governments.

Box 1. To Hedge or Not To Hedge?

The importance of hedging can be illustrated by the fate of two US companies in 1995. According to a report by *Futures* magazine[a/], Enron Oil & Gas company's aggressive hedging strategy for natural gas locked in a guaranteed and profitable natural gas price for 1995. Meanwhile, failing to hedge its yen-denominated debt has reportedly contributed to driving Brothers Steamship Co. into bankruptcy. This shipbuilding company contracted to built ships in 1984 and watched as the dollar declined by more than 60 percent against the yen during the past ten years.

a/*Futures*, "1995 Tops & Bottoms," January 1996, p.70.

5. Advantages of Using Commodity Derivative Markets

Commodity derivative markets have several advantages over price stabilization schemes:

- ***They reduce the uncertainty regarding future revenues (or expenditures).*** Derivative markets increase the probability that anticipated future revenues (or expenditures) will be realized. They enable producers to lock in a price that will cover their costs or minimize their losses if market prices are low and enable private traders to lock in profit margins. Importers can remove uncertainty related to future import prices and users of raw materials can lock in their commodity-related costs. This ability to lock in margins leads to a reduced commercialization margins. In the absence of such instruments, traders would require higher margins to cover themselves from adverse commodity prices movements that could eliminate their profits.

- ***They rely on market prices rather than administrative prices.*** Derivative instruments expose market participants to market prices and to market expectations of future prices, and thus reduce the need for governments to use subjective price forecasts to set prices and reduce. The reliance on market prices has implications for resource allocation; resources will flow to sectors where market prices are expected to be more favorable.

- ***They shift the risk outside the country.*** Commodity derivative instruments shift the risk from developing countries to consumers, producers, traders or speculators in industrialized countries, who are better able and/or willing to take the price risk because they have the opposite exposure. These instruments can therefore be used as insurance at low cost.

- ***They can reduce the cost of commodity financing.*** Financing commodity trade and commodity-related projects in developing countries exposes the lender to price risks, since the borrower's ability to repay the loan largely depends on future commodity prices. Commodity derivative instruments can be used to lock in future revenues and assure the lender that these revenues will cover repayment of the loan. Thus, they can increase the creditworthiness of the borrower. Loans for commodity-related projects can be structured in such a way that repayment of the loan is linked to future commodity prices; i.e. when commodity prices drop the borrower pays less and when prices increase the borrower pays more, but can afford to do so because revenues have also increased. This matching of revenues with debt obligations improves the borrower's ability to service the debt. Commodity loans that have combined lending with commodity derivative instruments include Sonatrach (the state oil company in Algeria; box 2), Mexicana de Cobre (a Mexican copper producer), EBRD's aluminum-linked loan to Slovalco, AS..(an aluminum producer in Slovakia; box 3) and the PTA Bank in Kenya, which finances coffee exporters.

Box 2. Sonatrach's Oil-Linked Loan

Algeria's state-owned oil company, Sonatrach, entered into a loan agreement with a syndicate of international banks in November 1989. The loan, coordinated by Chase Investment Bank, London, consisted of a US$100 million conventional floating rate loan (with a seven-year maturity and a four-year grace period) and a series of oil option transactions. The proceeds of the loan were used to replace expensive (4 percent above LIBOR) short-term loans, reducing Sonatrach's cost of interest service. With this scheme, Algeria reentered the medium-term syndicated loan market at a much reduced cost. Sonatrach pays an interest rate of 1 percent above LIBOR over the life of the loan. Without the scheme, the cost would have been 3–4 percent above LIBOR.

Two special features were added to the loan. First, Sonatrach sold Chase four call options written on oil (the maturities of the four options are 6, 12, 18, and 24 months), thus reducing the cost of funding. Sonatrach pays Chase a certain amount of cash if the price of oil rises above a prespecified ceiling (for instance, US$23 per barrel). Selling the oil options did not significantly increase Sonatrach's risk, since its revenues would also increase, but Sonatrach traded some upside potential in its oil export revenues for an immediate reduction in cost of funding.

The second feature was designed by Chase to bring other banks into the syndicate and give them an opportunity for additional profits from oil price movements. Chase pays the syndicate an additional interest margin above LIBOR if the oil price rises above or falls below a prespecified price range—in effect, 0.125 percent for a one dollar move in the price of oil, if the price moves substantially. This does not affect Sonatrach's payments; the extra margins are provided by Chase. This could have increased Chase's oil price risk, but the risk was eliminated by complicated transactions in the options market.

Box 3. EBRD's Aluminum-Linked Loan

In late 1995, the European Bank for Reconstruction and Development (EBRD) issued a $110 million loan to Slovako AS., a Slovak primary aluminum producer, which linked the repayment of interest and principle to a selected average of the price of high-grade aluminum traded in the London Metal Exchange (LME). The loan, to finance Slovako's new smelter, was originally linked to Libor but was later linked to aluminum prices. The loan protects Slovako from a fall in aluminum prices because it links the repayment of interest and principle to aluminum prices. The loan period is about eight years, with the commodity linkage scheduled for at least the first two years. However, officials at EBRD expect the repayment terms to be renegotiated periodically to extend the link with aluminum prices (and thus extend the price protection) over the entire loan period.

6. Who Benefits from Using Commodity Derivative Markets?

The private sector uses derivative markets to protect profits and secure financing. One consequence of agricultural market liberalization is the shift of part or all of commodity price risks from the government to the private sector. Where governments prior to liberalization offered price protection, after liberalization they are passing more of the price uncertainty to local private traders, processors and producers, who need to use instruments that will enable them to protect their profit margins against commodity price fluctuations. In the absence of such instruments, the margins required will be higher to cover the possibility of adverse price movements, and even with higher margins some traders and processors could still go bankrupt if commodity prices move abruptly. Producers need protection against price uncertainty because their planting and harvesting decisions depend on future prices; securing these prices enables them to make appropriate decisions about allocation of resources. Thus, resource allocation will improve.

Possible uses of commodity derivative markets by the private sector can be illustrated by the following examples. An exporter has bought coffee from farmers but has yet to sell it to a foreign buyer and is therefore exposed to price uncertainty. If prices decline his profits will be negatively affected. How can he protect himself? At the time of purchase he can sell a futures contract, then buy back the contract when the coffee is sold to a foreign buyer. If prices have declined between time of purchase and the time of sale, the exporter will receive a lower price for the coffee, but this lower price will be compensated by the profits in the futures market (he sold futures at higher price than he bought). The opposite will be true if prices increase. Thus, in the end the exporter's realized price will be very close linked to the price of the futures contract he sold when he purchased coffee from the farmers. Thus, price uncertainty is largely removed from the exporter's transaction.

If the exporter wanted to ensure a minimum price, instead of a futures contract he could have purchased a put option. If prices decline the exporter will exercise the option and be compensated for the lower price at which he sold the coffee. If prices increase the exporter will not exercise the option and all profits from the higher price will accrue to the exporter. However, options require the payment of a premium, (futures do not) which could be costly at times. On the other hand, the purchase of an option does not require margins (something that futures do) which may be easier for the exporter from a cash flow point of view.

Hedging in this way is very important for agricultural commodities because harvesting takes place in few months while selling takes place throughout the year. The use of derivative markets by local traders is therefore necessary to reduce price uncertainty related to holding inventories, and to give traders flexibility with regard to buying and selling. If he cannot find a buyer or seller, the trader can sell or buy futures contracts to lock in a price; then, when he sells or buys the physical commodity he can buy or sell the futures contract. As in the previous example, gains (losses) from the futures transaction will compensate for losses (gains) from the physical transaction.

Traders can use a large number of strategies involving derivatives and use several derivative instruments to reduce their exposure to price risks. The choice of strategy or instruments depends on the type of price uncertainty the trader faces and the cost and benefits of each.

Can farmers use derivative markets? Commodity derivative markets are based on large volumes handled by exporters, large local traders, importers and large local processors. Unless farmers have large commercial farms, they usually do not use derivative markets directly. This is because they lack the volume necessary to sell a futures contract, the infrastructure necessary to access derivative markets (hardware, internal systems, know-how, etc.), and the capital required for such transactions. In contrast, metals and oil producing companies, whether private or public, usually tend to operate directly in the derivative markets because they typically market their own product and operate in large volumes.

However, farmers can use derivative markets indirectly through intermediaries, without negating any of the benefits of these markets. The key issue regarding intermediation is whether a third party can perform the function more efficiently; that is, at the lower cost. The use of commodity derivative markets requires adequate lines of credit, know-how, infrastructure, and market information. In the grain market, for example, a grain elevator company may offer to buy grain from farmers at a fixed or minimum guaranteed price. The company can then use the derivative market to hedge the assumed price exposure (a simple strategy would be to sell futures contracts or buy a put option). Farmer associations or cooperatives can also act as intermediaries to manage price risk for their members; by using commodity derivative markets the associations can offer minimum price guarantees to their members. For example, FEDECOOP, the apex organization of coffee cooperatives in Costa Rica, is using commodity derivative markets to hedge the coffee farmers' price risk.

Also in Costa Rica, coffee farmers receive a first payment from the millers when they deliver their coffee, and subsequent payments throughout the crop year as millers sell the coffee to exporters. Because millers cannot recover money from the farmers in case coffee prices fall below the first payment, and given the high volatility of coffee prices, millers are only willing to advance about half the expected price as an initial payment. Thus millers offer a minimum price guarantee (an option) to the farmers. However, several millers have managed to advance more than three quarters of the expected price by purchasing put options to insure themselves against declines in coffee prices. The cost of the option is deducted from the payment to the farmer. Millers that offer this option to farmers have attracted business since farmers like the price protection. Thus when farmers access commodity derivative markets indirectly, an exporter, trader, or farmer association can absorb (or aggregate) the price risk from many smallholders and hedge the exposure in the derivative markets.

Another example, Central Soya, a grain processing company in Poland, has introduced a risk management instrument for local producers. Central Soya agrees to

purchase grains, but producers can opt to fix (call in) their price and receive payment at some future date. Central Soya guarantees that they will receive a price no lower than the price on the day of delivery. In that sense, the Central Soya contract works as a put option. By delivering and not fixing their price, producers can take advantage of the increase in price later in the season (they can spread their sales), and also have price protection: prices cannot drop below those on the day of delivery. Without this system producers would need either to sell at harvest, when prices are usually at a seasonal low, or store and sell later, thus incurring storage costs. For Central Soya, the delay in payment means savings in the cost of financing its purchases. Producers, for their part, can use the Central Soya contract to obtain financing from banks.

Governments can also intermediate for small farmers. For example, in Mexico, the government is offering a guaranteed minimum price to cotton farmers and hedges its exposure by purchasing put options on the New York cotton exchange.

Governments can also benefit by using derivative markets in government sponsored commodity programs. Governments are being forced to examine new approaches to providing income and price support to producers of agricultural commodities. This trend is being driven by attempts to rein in government expenses, the desire of producers to have friendlier and more flexible support mechanisms, and the requirement to comply with international trade agreements. Governments are also trying to ensure that new approaches maintain suitable safety nets for producers but without interfering with market forces.

In this context, commodity derivative instruments such as futures, options on futures, swaps and commodity bonds are being examined and tested to determine their viability to provide a suitable level of price protection and income stabilization that is cost effective and trade neutral. The use of financial markets is attractive to producers, market participants and program administrators because, compared to government price stabilization programs, this approach is considered to:

- be less expensive to manage and operate.
- be consistent with GATT,
- provide producers with benefits comparable to traditional programs, and
- be market neutral because premiums are established in open markets.

The U.S. Department of Agriculture (USDA) and Agriculture and Agri-Food Canada (AAFC) have implemented pilot projects that use commodity-derivative based instruments to provide participating producers with an alternative to traditional farm income support programs. The USDA program provides participants with option on futures contracts and small subsidies to cover brokerage commissions. The program is available to a small subset of regular feedgrain and wheat program participants.

The options pilot project in Canada differs substantially from the USDA program. It provides all cattle producers with market access to a specialized put option, comprised of Canadian dollar-converted US live cattle futures. The put option is roughly one-fifth the size of the regular futures contract in Chicago (annex 2).

The USDA pilot was initiated in the 1990 Farm Bill and the Canadian pilot was approved in 1994 following the cessation of the National Tripartite Stabilization Program (NTSP) for live cattle. The USDA pilot project has been active for the past several crop years and participation has been large. The Canadian pilot began in May 1995.

These pilot projects are examples of how governments are using financial instruments to provide risk management mechanisms for producers. Other governments are using financial instruments to re-insure their own risk directly. For example, the Mexican government has used financial instruments to manage their commodity price exposure in offering price protection to cotton growers (box 4). Also in Mexico, before the devaluation of 1994, the government used commodity derivative markets to lock in the amount of subsidies to corn farmers. The government had set a farmgate price of 750 pesos per ton and was compensating local millers for the difference between the fixed farmgate price and the international (US) price for corn at their factory gate, which was below the fixed farmgate price. If the US price were to drop, under this arrangement the government would have to pay more money. Because of this uncertainty, the government set up a swap with a leading international brokerage firm that would fix a priori the amount of money required to support the fixed corn prices. In several other countries, government organizations utilize financial instruments to offset foreign exchange and interest rate risk.

In general, there is an inverse relationship between commodity prices and the level of government expenditures. In the US for example, if corn prices decline, government deficiency payments to producers will rise. To the extent that policies are income oriented, a similar inverse relationship exists between the actual profit margin of a producer and government outlays. This has generally been the case in government support programs to Canadian livestock producers. In either event, the outcome of many farm income and price support programs is directly related to a market action. To the extent that there is a financial market corresponding to the government program mechanism, such as corn or livestock futures, there is the possibility of using a financial instrument to counter or reinsure the market based risk to producers.

The success or failure of the USDA and Canadian pilot projects has yet to be determined. However, clear lessons can be learned by better understanding their goals, objectives, functions and features.

Box 4. Mexico's Cotton Price Support Scheme

Because of the recent liberalization of agricultural trade and internal marketing systems in Mexico, farm-level prices of several agricultural products are now determined mainly by international markets, and farmers have had to cope with price uncertainty between planting and harvest times to a degree unknown before. During 1993, for example, the international price of cotton fluctuated between 52 and 60 cents a pound.

The government has responded with a program designed to guarantee a minimum price to cotton growers. Through ASERCA, a government organization providing support services for agricultural commercialization, Mexican cotton producers are able to manage their price risks during the harvest period and are guaranteed a minimum price during the planting season. Although programs guaranteeing minimum prices are common, most programs simply transfer price risks from producers to the government budget through the floor price mechanism, and most programs fail—sometimes spectacularly—when sudden price changes overstrain the government budget. Necessity is the mother of invention, and ASERCA, lacking the budget to assume the price risk directly, designed a sustainable program to transfer the risks from growers to international markets.

During the planting season, ASERCA offers farmers the chance to participate in a program guaranteeing a minimum cotton price for a fixed fee. The minimum price is fixed using the New York cotton futures exchange. For a fee, ASERCA offers a guaranteed price (in US dollars) and hedges its own risk by using the fee to purchase a put option on the exchange for future delivery at harvest time. (The put option gives ASERCA the right to sell cotton on a specific future date at a prespecified price, known as the strike price.) Should prices subsequently fall, ASERCA pays farmers the difference between the New York price at harvest and the minimum price. This difference is exactly equal to the payoff value of the put option. If prices rise instead, ASERCA makes no payment to farmers.

By paying a fee and participating in the program, a farmer in effect purchases insurance against a drop in prices below a certain level-in fact, the program refers to the fee as a "premium." As with insurance, payouts do not always occur, so the program is not without costs.

Private brokers could offer similar programs, although the private sector has had little experience in providing such services directly to growers. Since ASERCA's program is inexpensive to administer and demand driven, however, ASERCA can readily reduce its presence should a market for private brokers develop.

Traditional farm programs have provided participating producers with largely predetermined prices and, to a certain extent, farm income. The "price" to producers of these guarantees is determined by a combination of administrative decisions, such as acreage set-asides; and market factors. However, the level of producer support is typically known in advance. Often these programs are accused of interfering with competitive markets and distorting trade. Traditional programs have been expensive to manage and operate. Table 3 summarizes the similarities and differences between traditional commodity programs and derivative-based approaches.

Table 3. Comparison of Commodity Program Approaches

	Traditional Program	Derivative Instrument Approach
Producer flexibility	none	very much
Income/price support	extensive	adequate
Trade distortion	questionable/significant	none
Support established	administratively	market-based
Government cost (and/or consumer cost)	considerable	minor
Producer cost	none	some

Empirical evidence supports the use of commodity derivative instruments as efficient and effective commodity price risk management tools. Traditional futures markets have offered a limited number of instruments directly related to crop and livestock production. But now that agriculture has become more sophisticated, with a larger number of commercial crops and agricultural products being produced and traded in greater quantities, more sophisticated instruments are available. These are now possible because of increased linkages among agricultural markets worldwide as a result of economies' liberalization. Domestic and international prices are now linked, making the use of derivative instruments more accessible to developing country governments and to the private sector. Commodity brokerage houses and banks are also becoming more sophisticated in providing alternative products in the global market place.

Since many government farm income and price support programs are now directly related to the futures and options markets, the use of market-based risk management alternatives by governments is generally considered a transitory step. In most of these government price support programs, the government's intention is to allow the private sector to develop price hedging instruments, with the government remaining involved only until such private sector alternatives develop. Thus, the sequence is from traditional government farm price support programs, to programs where the government uses market-based hedging tools, to the evolution of the private sector in directly hedging agricultural price risks.

Other than hedging their exposure from offering price protection, governments can also benefit from using commodity derivative markets when their revenues and/or expenses depend on commodities. This can be, for example, through export taxation, or even indirectly through income and expenditure taxes. Governments may also be concerned about the unpredictability of their foreign exchange revenues. Commodity risk management has the potential of simplifying governments' budgetary planning, improving budgetary control, and avoiding the need for crisis management as a result of unforeseen revenue shortfalls. An example of these benefits is the case of Mexico during the Gulf War. In late 1990 and early 1991, the Mexican government used commodity derivative instruments to protect its crude oil export earnings against a price drop. Mexico's hedging strategy ensured that it received at least $17 per barrel, the price used as the basis for its 1991 budget. Its participation in commodity derivative markets reassured investors that regardless of oil price movements, the economic program and the budget would be sustained.

7. Risk Management Tools Can Facilitate Credit Flows and Trade Finance

For many developing countries, commodity markets provide the strongest link to the global economy. In these countries, commodity exports provide not only most of the export earnings, but also a conduit for financial flows. Since developing countries generate small amounts of domestic capital via savings, such external capital flows are essential to economic growth. For countries in transition and for recently liberalized commodity subsectors, the quick establishment of credit flows is crucial to the success of reform. This section describes how commodity risk management tools can and have been combined with traditional financial tools to enhance credit flows.

The question of who will finance crop exports is crucial for countries contemplating the removal of government commodity marketing boards. In many cases, single-channel marketing structures have been in place for decades, supplanting market-based institutions and financing arrangements. In fact, in some cases, it is the financial failings of the old system that precipitated reform. For example, a financial crisis among the cashew marketing cooperatives in Tanzania in 1991 led to the dismantling of that country's single-channel marketing system and the introduction of private trade.

One of the simplest trade finance arrangements is export *prefinancing*. Because this type of arrangement requires minimal institutional infrastructure, it becomes a convenient method of crop financing following marketing reforms. For example, most of the cashew and cotton crops in Tanzania are prefinanced, as well as most of the coffee trade from Uganda. In the most straightforward version of prefinancing, an offshore buyer identifies a local counterpart and contracts the purchase of a fixed quantity—for example, 100 tons of coffee. Using an observable forward price—for example, the London robusta market—the buyer and his local counterpart agree on a fixed price for the specified quantity, which includes a financing charge. The offshore buyer then provides a limited line of credit to his local counterpart, which is drawn down as the local crop is purchased. The debt owed by the local counterpart to the offshore buyer is then canceled when the commodity is delivered to the offshore buyer. The loan is frequently denominated in dollars and the credit is exchanged for local currency only as required, minimizing the risk associated with currency fluctuations. Further, the offshore buyer may have already sold the commodity forward to minimize his own price risk.

Prefinancing arrangements have been essential to the success of commodity subsector reforms in Uganda, Tanzania and other countries. Smallholder farmers have benefited greatly, receiving prompt payment and a much greater share of the export price than under the premarket liberalization system (the Ugandan coffee reforms, box 5). However, such loans are unsecured and entail a great deal of counterparty risk. Although the financing charges associated with prefinancing are usually much lower than domestic alternatives, unsecured credit can still be expensive, encouraging local buyers to turn over their working capital quickly and limiting their ability to shop price. For example, such arrangements are turned over in as little as six working days for coffee in Uganda. In

addition, this method of finance is not readily available to all market participants, since it is based on personal relationships.

An alternative method, *warehouse-receipt financing,* provides a method of collateralizing the crop to lower risk to the lender and thereby lower finance charges to the borrower. To work well, this method requires that the receipt have a recognized basis in law so that the ownership established by the receipt is not readily challenged. After placing his commodity in a bonded and insured warehouse, the local owner is issued a transferable receipt which declares the weight and quality of his stored goods. The receipt can be used as collateral when borrowing from banks or from the warehouse itself. The financial institution is assured of the quality and quantity of the collateral by the warehouse, but still faces fluctuations in the value of the collateral. As a result, the financial institution will only lend a percentage of the value of the stored good—frequently 60-70 percent—but at rates much more favorable than unsecured lines of credit. However, when the owner combines the warehouse receipt with a *put option*, the financial institution can establish a floor for the price of the commodity, thereby guaranteeing the value of the collateral. The PTA Bank, a regional development bank in Kenya, uses a similar scheme to finance commodity trade in East Africa.

Another useful risk management tool for commodity financing is *forward sales.* The forward markets generally evolve to facilitate processing. For example, an edible oil refiner may well want to purchase crude palm oil and simultaneously sell the palm oil olein and stearin (end products of the processing) forward, guaranteeing a profit from the processing. Sometimes the local markets are established informally through telephone communications (for example, in the Indonesian palm oil market) and sometimes through more formal exchanges, such as the forward maize contract offered by the Zimbabwe Agricultural Commodity Exchange.

For some markets, such as petroleum, gold, copper and sugar, there are liquid forward markets spanning two or more years. Firms can use forward sales to lock in profits and thereby enhance their creditworthiness. For example, exporters in Thailand have entered into three and four year fixed price agreements which guarantee margins above production costs. Based on such forward contracts, Asian banks have been willing to lend to the firms at favorable rates.

A slightly more sophisticated approach was taken by Pemex, Mexico's national oil company in 1993 (UNCTAD 1995). Pemex created the Pemex Receivables US Masters Trust, which raised capital through certificates issued to large private investors. Payments from the trust against the certificates were secured in part by agreements pledging the proceeds from forward sales to a number of American oil companies in the trust.

Forward sales require an explicit agreement by one partner to sell and another party to purchase a fixed amount of a certain commodity with an agreed-upon pricing arrangement. Another mechanism, *commodity bond financing*, uses future production to

finance current investments. One example of this type of financing is the Ashanti Gold Corporation in Ghana. In partnership with the IFC, Ashanti issued bonds to raise $140 million in 1992 to construct a new sulfide treatment plant. The loan can be drawn in either dollars or gold. It carries a variable interest rate linked to the London Gold Lease Rate. If the loan is drawn in gold, the payment schedule is payable in the dollar equivalents of the gold amounts. As a result, the payment schedule can be linked to the proceeds of future production—regardless of the future value of the gold. In turn, bond holders who would prefer fixed dollar returns to their loan can hedge the value of that future payment.

Box 5. Reforms in the Ugandan Coffee Sector

Several lessons can be drawn from the experience of coffee reforms in Uganda. First, separating the regulatory and marketing functions of marketing boards can provide a more stable transition period. Essential services such as quality monitoring can continue without competing for often diminished parastatal revenues, and the market retains an experienced and known agent. Second, the private sector can emerge quickly. Despite a thirty year absence, the private sector captured 70 percent of Uganda's export market within three seasons (figure 1). Third, the private sector can also be a channel for credit. In Uganda, several of the private traders (now numbering over 100) established financing agreements with foreign buyers and extended cash purchases down to the farm level. Fourth, local banks may not be able to immediately meet the new demand for financial services, including risk management. In Uganda, the link between traders and foreign buyers came about in part because local banks were inexperienced in financing commodity trade due to Coffee Marketing Board's longstanding monopoly. Finally, under liberalization efficiency gains can dramatically increase the farmers' share of the export price (figure 2).

Figure 1. Share of coffee export market.

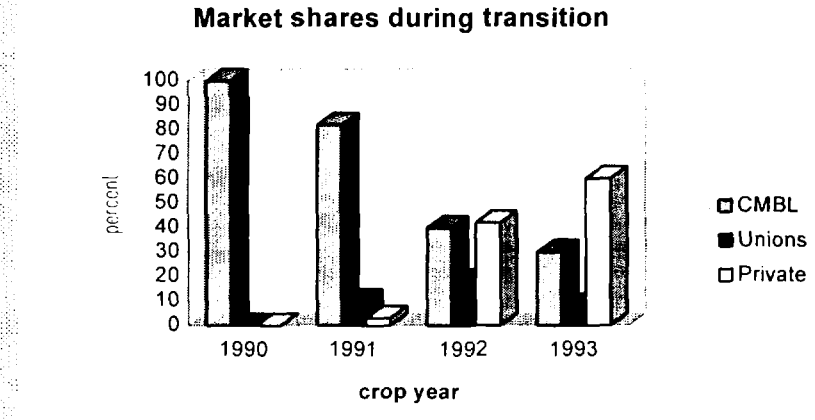
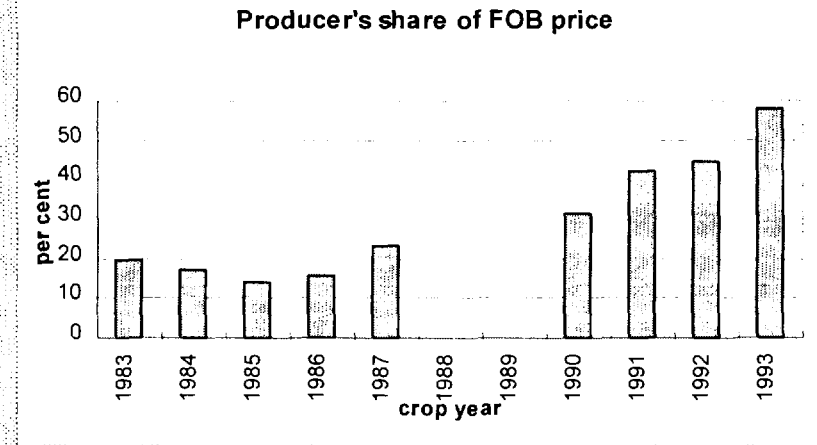


Figure 2. Farmers' share of coffee export price.



8. Overcoming Some of the Barriers for Using Commodity Derivatives

Although the use of derivative markets provide an attractive alternative for both government and the private sector in developing countries to manage their commodity price risks, they still are not widely used. So why do only some countries attempt to manage their commodity price risk using commodity derivative markets? Because developing countries face certain barriers. The most important are described below.

Legal and regulatory barriers

Many developing countries have exchange controls which prevents users from having access to foreign exchange to settle initial and variation margins for the use of futures contracts or pay premiums (and margins if necessary) for options. Other developing countries have laws prohibiting access to international futures markets completely. Colombia, for example, prohibited the use of external risk management instruments until the early 1990s. Only after the Colombian government changed the legal framework was the private sector allowed to hedge price risks using commodity derivative markets.

Policy barriers and government intervention

Various parties in a developing country are often exposed to external price risks due to complex and nontransparent institutional arrangements, market failures or (policy-induced) distortions or regulations. Consequently, there may be fewer incentives for any party to engage in risk management. Particularly since the majority of risks will either fall on the small producers and consumers, who do not possess the means to manage them effectively, or be absorbed by the government budget. Government organizations that face a "soft" budget constraint also little incentive to manage commodity price risks.

In some developing countries, government intervention may greatly diminish the price risk incurred by the private sector and thus reduce the incentive for the sector to manage risk. This may happen through explicit or implicit guarantees such as price stabilization schemes, bank deposit insurance schemes, guaranteed exchange rate coverage, etc. In some circumstances, the tax system may present a deterrent against hedging, since net profits may be less exposed to external price risks than gross profits. Because private companies are only interested in hedging net profits, they will have less incentive to hedge (implying that tax revenues, the difference between gross and net profits, are exposed to price risk). Some specific examples are below.

In Brazil, prior to reform movements in many domestic commodity prices differed from international prices, leading to difficulties in using internationally traded derivative instruments for hedging. Domestic prices differed from international prices not because of differences in grades of the commodity, etc., but because of government intervention in the spot (cash) market and other policy-induced distortions. In response, trading company subsidiaries of commercial banks issued short-term certificates of

deposit linked to domestic commodity prices. As a result, a domestic hedging (futures) contract was created, and some risk reduction was achieved. In principle, however, the use of international commodity derivative markets would have been preferable.

A similar situation existed until the late 1980s in Argentina, where the grain sector was burdened by high levels of direct and indirect taxation, an expensive marketing system, and other government regulation. As a result, domestic prices were not related systematically to world prices. The liberalization of the Argentine grain sector, including the abolition of the National Grain Board (which acted as regulator as well as trader), should do much to bring domestic prices in line with international prices, and in that way allow greater use of international hedging instruments.

Currently in Croatia, government intervention in purchasing, storing and disposing of wheat surpluses causes domestic wheat prices to deviate from international wheat prices. As a result, private traders, even if they want to, cannot use internationally traded wheat futures and options contracts to hedge their price risk. A similar situation also exists for the grain markets in Poland and Turkey.

In Colombia, one of the major reasons private exporters have no incentive to hedge for longer periods is that export contracts are "opened" by the institution supervising coffee exports for no more than three months. As a consequence, the fees to be paid for exports three months ahead remain uncertain and, in effect, represent a larger risk to the private exporter than international coffee price risks. Even though there is an international hedging market with a longer horizon and with little basis risk, exporters do not use it and, in the end, small producers end up absorbing the price risk.

These examples make it clear that the measurement of exposure and the need for hedging should not just be evaluated for the country as a whole, but should take into account the risks borne by various entities within the country the marketing boards, farmers, cooperatives and private export and import companies. The distribution of risks and the interdependencies among risk bearers depend on the institutional structure in commodity production, processing, marketing and distribution. Hence, the design of a coherent hedging strategy can be a complex undertaking which needs to balance the concerns of all participants in both the public and private sectors.

Knowhow

Risk management activities require considerable knowledge of financial instruments and an appropriate institutional framework within which to carry out hedging operations. Expertise is required to understand the risk structure of the company or economy, identify appropriate risk management instruments and engage in and supervise hedging transactions. Unfortunately, many developing countries lack the expertise for these operations. Furthermore, an institutional framework may be necessary to introduce adequate reporting, recording, monitoring and evaluating mechanisms, and to establish internal control procedures that can protect against speculative transactions and execution

errors. Box 6 presents some basic steps that companies can follow in setting up a successful institutional framework to manage their price risks.

The recent cases of Codelco (a copper producer in Chile), MG Corp. (a unit of Germany's Metallgesellschaft AG), Procter and Gamble Co., Orange Country in California, Sumitomo, and Barings Bank have shown that the lack of internal controls and systems to monitor the exposure from using derivative markets can result in very serious losses. These examples show that the lack of internal control procedures a problem not only among developing countries but in industrial countries as well. The problem is much more serious for developing countries that have weaker administrative capabilities

Awareness

Another important barrier to using these market instruments is a general lack of familiarity with their strategic uses, and a misconception that hedging is the same as speculation. Many policymakers expect, for example, that risk management will lead to consistently higher profits, lower debt service payments, higher export prices or, conversely, lower import prices. However, risk management involves a tradeoff between the assurance of predictable costs against future uncertain external price movements, which could produce either large windfalls or equally large losses. How risk management affects losses or gains to the economy depends on the (ex post) trend in prices, which cannot be anticipated.

The fact that policymakers are unaware of the costs of risk management—in terms of foregone higher revenues—can lead to successful hedging programs being perceived as failures, or can prevent potential attractive hedging programs from getting started. Political backlash has occurred when transactions turned out unfavorable ex post. For example, when Brazil and Chile locked in crude oil import prices during the 1990 Gulf War, these prices were considered high ex post, since crude oil prices declined after the end of the war in 1991. In this respect, options, in spite of their "speculative" payoff profile, can have advantages over other types of risk management tools such as lock-in instruments. They are an insurance instrument that provides protection against adverse price movements. At most, the premium is lost; thus the use of options may cause less political backlash than locking in a fixed price.

Barriers related to technology

Critical preconditions needed for effective use of risk management instruments may not always be in place in developing countries. Technical factors such as transport, storage, time differences, data processing and, especially, communications bottlenecks can represent barriers.

Box 6. Avoiding Failures in Derivative Markets

To avoid failures, companies need to properly control and aggressively manage the risks associated with derivative instruments by creating a strong risk management infrastructure. A strong infrastructure will not only facilitate the effective control and management of these sophisticated instruments, but will also clearly outline set of strategic objectives for using these instruments. A risk management infrastructure allows the tracking of all derivatives that have been executed. It also entails agreement within the institution on an overall risk strategy, a definition of priorities, and a conceptual framework for managing risks that fits into the company's commercial strategy. Some steps that companies can take to set up a successful institutional framework to manage their commodity price risks are:

Define your company's commodity price exposure. Understand the commodity price risks that your company is facing. Quantify the impact of price changes on your company's cash flow and balance sheet to give you an idea about the cost of not hedging. Define your company's risk tolerance.

Formulate a clear strategy. Look into ways to deal with your company's price exposure, including the alternative of not hedging at all. Understand that while hedging may involve some risks and costs, not hedging may be riskier and costlier. Before choosing a hedging strategy, it is important to quantify the costs and benefits of different hedging strategies. Prior to selecting a strategy, there should be a clear understanding of how the performance (the success or failure) of hedges should be measured.

Explain the purpose of hedging and hedging strategies. Everyone who needs to understand the hedging strategy and its cost and benefits must be informed. Efforts to educate and raise awareness on this issue within your company are very important.

Select brokers carefully. Ensure that the brokers have the expertise and the products your company requires and that you understand very clearly the costs (including opportunity costs) and benefits associated with the products they offer. It is also important to distinguish between financial advisory and brokerage services.

Monitor positions regularly and develop appropriate controls. Ensure that no unauthorized trades are executed and that errors are detected early, set exposure limits, and monitor your positions frequently (preferably daily). Also, develop procedures to respond to possible emergencies. When setting up monitoring and control systems it is important to have a clear separation between the execution and the monitoring control of trades.

Basis risk and liquidity

Arguably, the lack of hedging by developing countries arises in part because the international markets for commodity risk management are incomplete from the point of view of many exporters or importers. There is often no perfectly matching hedging tool available for a particular commodity (e.g., tropical fruits), or there is a considerable mismatch between the characteristics of the commodity to be hedged and those of the commodity on which the hedging tool is based. The imperfect correlation between spot prices and futures prices for a commodity is called basis risk. The existence of basis risk does not necessarily imply that the other, more traditional risk management tools are preferable—nor that a country should establish a domestic futures exchange. But it does require an analysis of the causes, nature and magnitude of the mismatch.

The mismatch may be with respect to maturity or type of instrument. Maturities are generally limited to one to two years in the futures and options markets; long-dated, over-the-counter derivative instruments are often not available for the commodity in question. While the short-dated hedge might, in principle, be rolled over (i.e., renewed at maturity), so as to duplicate a long-dated hedge, in practice the protection offered by a rollover will be considerably less than that of a long-dated instrument because of basis risk arising from changes in the relationship between spot and futures prices. While using these short-dated instruments may significantly reduce the short-term exposure of many countries to price risk, hedging for longer periods with short-dated instruments is far from perfect.

In addition to maturity mismatch, basis risk also arises from the differences in characteristics of the commodity to be hedged and the hedging instrument. This is the risk that over a given period of time the price of the commodity to be hedged will not move in lockstep with the price of the commodity on which the hedging instrument is based. The reason for this can be the existence of many grades of a commodity (e.g., different grades of crude oil) and only a limited number of liquidly traded hedging tools.

Research has shown that for many commodities, both sources of basis risk could be relatively small. For example, in simulations of hedging crude oil exports or imports, it was found that by using short-dated futures (less than six months maturity), about 75 percent to 85 percent of the short-term price risk could be eliminated over the period 1985-1990 for most crude oils, implying basis risk of only 15 percent to 25 percent. This level of basis risk is not high, considering the large variety of crude oils we used (the API varied from 25° to 40°). Using longer-dated futures for hedging oil prices, the other form of basis risk became more important, but again, not by much: at least 70 percent of the price risk in excess of six-month horizons could be eliminated for most crude oils (Claessens and Varangis 1994 and 1995).

Similar results were found for coffee. In the cases of Costa Rican and Colombian coffee, for example, the basis risk using New York coffee futures contracts for nearterm hedges was found to be relatively low, measuring 6 percent and 13 percent respectively. For cotton, results suggest that despite the existence of relative high basis risk between

prices of varieties from developing countries and New York cotton futures contract prices, hedging reduces price risk by 30 percent to 70 percent (Satyanarayan and others 1995). Basis risk in cotton was smaller among countries with little government intervention in the cotton sector, such as Argentina, Mexico, and Peru, and higher for countries with higher intervention, such as Turkey.

Basis risk as well as liquidity will remain the important issue for all types of commodity risk management instruments. While for the three commodities analyzed (and many others), basis risk need not be a serious constraint to using existing (external) futures markets, we cannot expect that the markets for commodity risk management instruments will develop sufficiently for all commodities. On the short end of the hedging spectrum, the introduction of new instruments—which would reduce basis risk problems for a group of consumers or producers—will be constrained by inadequate liquidity.

Constraints are more severe at the longer end. For example, longer-term swaps and other long-term risk management instruments for agricultural crops such as coffee, cocoa and cotton are inherently more problematic, in part because of uncertainty in the production of agricultural commodities. The development of markets for long-dated instruments for these commodities can thus be expected to take some time, and in the meantime rolling over short-term hedges will lead to higher basis risks.

Creditworthiness

Because some developing countries have low credit ratings, commercial banks and brokerage houses have shied away from dealing with governments and private firms in these countries. Forward, swaps and options (if sold) contracts require high credit ratings (they are credit intensive). The longer the maturity and the greater the volatility in the commodity price, the higher the credit risk. As long as some developing countries have low credit ratings, their access to longer-dated commodity derivative instruments will be severely constrained. Short-dated, exchange-traded futures and options, which are subject to margin requirements, can help overcome the credit risk. But margins can create a cash flow problem. Options, regardless of maturity and whether bought on an exchange or over the counter, carry no credit risk for the developing country.

Forward, swap, and option (if sold) contracts involve a consideration of the counterparty's creditworthiness, however. The longer the performance period (the length of the contract) and the greater the volatility of the underlying price, the greater the credit risk. Since many developing countries lack sufficient credit standing, their access to long-dated risk management instruments will be limited. Most market participants are, for example, reluctant to offer entities in even the most creditworthy developing countries swap contracts which extend beyond one year.

But there are encouraging signs. Private borrowers in several developing countries now have better access to foreign finance, although in some cases borrowers they are required to put up collateral or other forms of security such as pledges of future receivables. Private entities in some developing countries are now also using short-dated

swaps for hedging purposes. For instance, in Chile, Mexico, and Papua New Guinea, export financing is combined regularly with commodity swaps. The commodity swaps form part of a hedging package by providing price assurance for future export earnings. For added security, the proceeds from exports could be deposited at an escrow account abroad and returned to the country after the lenders are paid off. This has been, for example, the case of Mexicana de Cobre, a Mexican copper producer that received a loan from a syndicate of banks headed by Paribas on the condition that it use a swap to hedge its copper export revenues.

In Chile, an intermediary in the copper industry, ENAMI, offers its customers (producers) the possibility of guaranteeing a minimum price for their copper exports, in exchange for which the producers agree to share to a lesser extent in upward price movements. ENAMI covers this guarantee through a series of options and futures transactions in the international markets. Risk management is important for these producers since their marginal costs of production are quite high. Performance (credit) risk on the part of the private producers is minimal for ENAMI, since it has a natural monopoly on producers products, while as a semi-state entity, it has good credit standing abroad.

Premiums and cash flow problems

The upfront costs of some risk management instruments can be a barrier for countries that already have problems raising foreign funds. Purchases of put options (for protection against lower prices) and call options (for protections against price rises), require a significant upfront premium, usually a significant portion of the value of the asset to be hedged. The cost of the option will depend on (i) the extent to which the option is out of the money (i.e., the exercise price of the option is beneath the prevailing futures price); (ii) the term of the option; and (iii) the volatility of the underlying commodity futures price. At "normal" levels of volatility and for six month options a few cents out of the money, prices are usually around 3 percent of the underlying futures prices (or the value of the asset to be hedged). However, hedgers can lower the cost of price protection by using futures and some collars (buying a call (buyer of commodities) or put (seller of commodities) and selling a put (buyer) or a call (seller)).

In addition, purchasing/selling futures and selling options requires the deposit of an initiation and variation margins. The cash flow implications of margin calls on futures (and short option) positions can be an important problem. Maintaining margin calls requires daily funds, depending on the daily fluctuations of the commodity price that is hedged. Daily margin calls can also be a serious constraint because foreign exchange is not always readily available for entities in developing countries. However, it should be noted that margin calls do not represent a cost; the negative cash flow effect of margin calls is offset by higher (for a buyer) or lower (for a seller) commodity prices.

9. *Establishing Commodity Derivative Markets in Developing Countries versus Using Existing Markets.*

Why establish a futures market?

The desire of some developing countries to set their own commodity futures/options exchanges (CFOE) is related to three factors; (i) their desire to improve the price discovery process in their country and obtain more meaningful forward prices; (ii) the notion that if a particular commodity accounts for a large portion of a country's economic activity, then it should also be priced in that country's own marketplace; and (iii) the benefit of lower basis risk (for some commodities, no futures contracts exist at all). In addition, many developing countries considered a CFOE the logical next step after the development of stock and financial markets. CFOEs already exist in several developing countries and transition economies including Argentina (grains and livestock), Brazil (livestock, coffee, cotton and gold), China (various metals and agricultural commodities), Hungary (grains and hogs), India (pepper), Malaysia (palm oil, tin and cocoa), the Philippines (copra, sugar, coffee, soybeans and dry cocoon), Russia (metals), and Zimbabwe (corn and beans). Some of these countries, such as Argentina and India, have a long tradition in futures markets that was interrupted by excessive government intervention.

The two most important functions performed by futures markets are to facilitate the management of risk and to establish forward prices. Forward prices provide information to decisionmakers, which can lead to more efficient allocation of resources. Forward cash contracts, or forward contracts, often proceed the development of futures contracts. Forward as well as futures markets developed from well-functioning cash (spot) markets and added the time dimension. Forward and futures markets often exist side-by-side and complement each other,

Futures and forward contracts, however, perform different roles. Forward contracts are usually not fungible (i.e., liquid) because they are tailored to the particular market circumstances and transfer of the contract requires that the credit risk of the counterparty be evaluated. Futures contracts are standardized and traded on organized exchanges; and since no credit risk is involved, contracts of the same maturity are perfect substitute for each other. Hedgers and speculators are attracted to futures markets because futures contracts provide them with liquid, standardized financial instruments to assist them in the management of risks. Portfolio managers use the specific relations between individual futures prices and returns on other financial instruments to choose the composition of their instruments.

Conditions for establishing a domestic futures market

The most basic precondition for establishing a domestic futures market is a competitive, well-functioning spot (cash) market with transparent prices. This implies that the spot market should not be monopolized by either private firms or public entities. Additional conditions include a well-functioning infrastructure for product grading, distribution, transportation and storage. Also required are a legal structure and system of

property rights and enforceable contracts that can enforce repayment rules and provisions for liquidation in cases of bankruptcy. Traders must be knowledgeable about the concept of ownership and be aware of the associated risk. There must also be a stable and credible currency, reliable credit markets, and financial institutions willing to participate in these markets.

Following these basic conditions is a set of conditions related to futures trading itself. There must be a sufficient number of traders, speculators and financial institutions interested in a futures exchange. A country cannot depend only on producers and consumers to achieve a viable futures markets. The involvement of foreign firms is also necessary to achieve an external diversification of risk.

Rules for trading, and procedures for resolving disputes and conflicts and for preventing price manipulation need to be established. It is critical to establish a clearing house with sufficient financial resources to act as an intermediary in all trades and to serve as a generator of all transactions. A well-functioning clearing house establishes the financial integrity of the futures market; without it, traders will not have the confidence to use the market.

While these conditions are the basis for a futures exchange, however, they cannot determine whether a particular futures contract will be successful. The main conditions for a successful futures contract can be summarized as follows: First, commodity price and futures prices must be closely correlated. Second, the underlying commodity must be standardized in terms of size, grade or quality, place of delivery and month of maturity so that contracts become fungible and homogeneous. For agricultural commodities a grading system allows a wide variety of commodities to be included in the contract by applying necessary discounts and premia to the representative price. Third, for a contract to be effective as a hedging instrument, the cash price for each of the varieties needs to be closely correlated with the futures price.

The detailed specifications of the futures contract must reflect the activities and traditions of the spot market. These conditions are broad in nature and by no means guarantee the success of a futures contract, as measured by the trading volume (i.e., liquidity). Empirical findings suggest that the success of a futures contract also depends on the price variability of the commodity in question, the size of the cash market, the presence of an efficient cross hedge (or alternative contract to hedge) for the underlying commodity, and the contract design features.

Benefits in establishing a domestic futures markets

The two main benefits in establishing a domestic futures market are improved price discovery and reduced basis risk. Domestic futures markets may have less basis risk because the futures contract represents more closely the local cash commodity. Delivery at a nearby location will also reduce basis risk. As stated at the beginning of this section, other important benefits include: more publicly available information, improved transmission of price and other commodity-related information, improved credit systems,

more responsive capital markets, uniformity in repayment rules and market surveillance, reduced transaction costs and more accurate forward prices.

These benefits should be compared against the benefits and costs of using existing (foreign) futures exchanges, which have the advantage of being very liquid and well established in terms of rules and regulations. Higher liquidity may mean reduced transaction costs, which can outweigh the basis and exchange rate risks. The major risks when using existing (foreign) futures exchanges are basis risk, as indicated earlier, and exchange rate risk. When a country's currency is relatively stable, trading in an existing futures exchange may be reasonable given the higher liquidity and lower transactions cost, particularly since thinly-traded domestic futures market can have higher execution costs and higher basis risk than the combined basis and currency risks in an existing foreign exchange.

Major barriers to establishing domestic futures/option markets

While the establishment of a commodity futures market has a number of advantages, conditions in developing countries make it hard for commodity futures exchanges to be effective. The most important barriers to establishing future exchanges in developing countries are:

- Lack of infrastructure in areas such as in communications, transportation and information processing;
- Underdeveloped commercial and financial sectors;
- Government controls over commodities most likely to be traded on a futures market;
- Government regulations restricting the use of futures/options markets and/or the free flow of funds necessary to trade such markets;
- Lack of legal and regulatory framework necessary in establishing futures/options markets; and
- Insufficient capital among potential market participants to forestall counterparty risk; i.e. insufficient capital to form viable clearing entity.

While this list is not exhaustive, it is relatively comprehensive and represents the experiences of developing countries in trying to establish these markets, as well as experiences of various analysts who have dealt with this issue. While these barriers present real challenges in establishing new futures exchanges, they are by no means insurmountable obstacles.

Annex 1

Types of Derivative Commodity Instruments[1][2]

Forward Contracts

A forward contract is an agreement to purchase or sell a given commodity at a future date at a fixed (predetermined) price. At the day of delivery, if the actual (spot) price is higher than the fixed price the buyer makes a profit. If the price is lower, the buyer suffers a loss. The payoff for the seller is the opposite. In a forward contract the buyer and the seller assume each other's performance risk (risk of nondelivery). The terms and conditions of the forward contract are usually specific to each transaction, although some forward contracts are standardized.

Futures Contracts

A futures contract is similar to a forward contract: the buyer (seller) of a futures contract agrees to purchase (sell) a specified amount of a commodity at a specified price on a specified date. But futures contracts differ significantly from forward contracts in four ways. First, contract terms (amounts, grades, delivery dates, etc.) are generally standardized. Second, transactions are handled only by organized exchanges through a clearinghouse system. Third, profits and losses in trades are settled daily (marked to market). Fourth, futures contracts require depositing a certain amount of margin money in the exchange as collateral. Fifth, while forward contracts involve physical delivery at maturity, futures contract are usually closed before or at maturity. Thus futures contracts separate the physical purchase/sale of commodities from hedging. Through these arrangements, futures contracts significantly reduce the credit and default risk entailed in forward transactions. Liquidity (i.e., the contract volumes traded) also improves because of the standardization of contracts.

Options Contracts

An option on a futures contract is the right—but not the obligation—to purchase or sell a specified quantity of the underlying futures contract at a predetermined price on or before a given date. Exchange-traded options, like futures contracts, are standardized. There are also so-called over-the-counter options offered by banks and commodity brokers, which can be customized. The purchase of an option is equivalent to price insurance; therefore, there is a price to be paid.

Some important definitions regarding options include:

Call: A call option gives the buyer the right but not the obligation to buy the underlying futures contract at a predetermined price during a given period of time. Call options are usually purchased as insurance against price increases.

Put: A put option gives the buyer the right but not the obligation to sell the underlying futures contract at a predetermined price during a given period of time. Put options are usually purchased as an insurance against price declines.

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[1] This annex was jointly written with Eric Nadelberg, Tropical Trader Division, The Chicago Corporation.

Strike or exercise price: The price at which the futures contract underlying an option can be purchased (if a call) or sold (if a put). This is the predetermined price in the definition above.
Premium: The price paid for the options contract.
Exercise: To you exercise a call (put) is to buy (sell) the underlying futures contract at the strike price.
Time to expiration: An option is good only for the length of time specified in the contract. The last day that an option can be exercised is called the expiration date.

Swap Contracts

A commodity swap contract is an agreement to exchange, or swap, a floating price for a fixed price (or vice versa) for a given amount of a commodity at specific time intervals. A commodity swap is like a series of scheduled forward contracts lined up on a schedule, but these contracts do not involve physical deliveries of the commodity. Swaps are not for everyone. While they solve problems relating to the need for longer-term price fixation, they have disadvantages. They are credit intensive, and carry the risk of nonperformance. Because swaps ultimately involve an exchange of cash against an established pricing index, the counterparties have to feel comfortable with each other's ability to perform on this most critical aspect of the transaction.

Swaps can be a very capital-intensive instrument if the market goes in the direction opposite to that for which the user is taking the protection. For example, a fixed price seller, such as a producer, will need to pay out if the market rises. A sell swap effectively forfeits the upside of the transaction by payment to the floating price buyer of the price difference between where the market and where his fixed price sale is. However, the profit-limiting aspects of a swap can be remedied through the use of built in options which can allow partial or full participation in any profits that accrue outside of the swap.

Commodity Notes

Because of the ongoing financial responsibility that is part of a swap, as well as the potential loss of any market profits, commodity notes may be a preferred method for providing price protection, since the budget (of the buyer of the note, i.e., producer, exporter, government, etc.) does not forego the potential of additional profits if the market moves in a favorable direction.

Commodity notes and swaps share some common characteristics. They can be customized and involve no exchange of physical commodities. They also differ in some important aspects. Commodity notes are shorter term, usually from six months to a year, going out only as far as one year, and they are less credit intensive than swaps because they are purchased outright by the user. Also, as opposed to a swap, a commodity note guarantees the principle guaranteed even if the market direction is unfavorable.

The buyer of a commodity note is paid a rate of interest directly tied to the price of the commodity and the type of note purchased. A coffee producer government that buys a coffee bear note as a way to provide downside price protection to a grower receives a small interest payment, typically one percent per annum, if the market rallies, but receives an increased rate of interest as the market moves lower. The opposite would hold true for a buyer of a bull note, such as a processor, who receives an increased rate of interest as the market moves higher, but suffers no loss of capital if the market moves down. The only loss experienced by either user of the commodity note is the opportunity loss of higher interest rates if the market does not perform to the expectations of the note holder.

Another benefit of commodity notes is that they are an asset on the books of the note purchaser, and in some cases, the note can be hypothecated, or used as an additional instrument to lower borrowing costs in other areas. However attractive they may be, however, commodity notes are not a panacea because they have to be purchased outright. There is no leverage involved, and the fact that the notes need to be bought in $5.0 million or greater amounts puts them out of reach of smaller organizations.

Commodity-Linked Loans

In these loans, interest and/or repayment amounts are linked to the price of a certain commodity or to an index of commodity price(s). In a popular form of commodity-linked loans, interest and principal are paid in equal installments, the amount of which is linked to the cash equivalent of a certain quantity of a commodity. In another case, only the interest payments are linked to a commodity price. In any case, a commodity-linked loan combines a conventional bank loan with a commodity swap. A commodity-linked loan by itself, or a combined conventional bank loan and commodity swap, will both yield the same financial results.

Commodity Inventory Purchase Agreements Linked Notes

Commodity Inventory Purchase Agreement (CIPA) linked notes are another type of commodity linked loan. In a CIPA linked note, the transaction centers around bonded warehouse receipts as security for the loan. Funds received for the warehouse receipts are used to purchase a commodity-linked structured note; the principle of the note is guaranteed, along with a minimal interest payment.

The benefit of a CIPA linked note is that the user's commodity price risk is hedged with no premium payments. The notes are effectively financed by the inventories in place. As a note, the borrowing is effectively turned into an earning asset since it is backed by at least an "A" credit financial instrument, and the producer enjoys the full participation in any market gains that might accrue as a result of positive market action. Because the borrowing is backed by, inventory backing to the borrowing, CIPA linked notes are less credit intensive than a swap, but like a swap, they do not interfere with normal commercial relationships. However, because the commodity has now become an

asset, it allows the holder of inventory to keep possession for longer than a market or crop cycle, possibly improving his ultimate price.

Unlike some inventory-backed borrowings, however, no funds are directly given to the note holder. Instead the funds realized by the CIPA part of the CIPA linked note are used to purchase the note, and therefore the liquidity problems of certain borrowers may not be solved. In a CIPA linked note, a secure bonded warehouse receipt is needed to drive the transaction, a fact that may limit its use in certain countries that do not have proper warehouse verification procedures in place.

Commodity Bonds

Commodity bonds can be either a forward type or an option type. In the former, principal and/or coupons are linked to the price of a certain commodity or to an index of commodity price(s). If only the principal payment (redemption value) is linked to a commodity price, this bond is, in effect, a security in which a conventional bond and a commodity forward contract are combined. If the coupon payments are also linked to a commodity price, the bond is a combination of a conventional bond and a commodity swap. Note that a commodity-linked loan is a combination of a conventional loan and a commodity swap contract. The same principle is applicable to this type of commodity bond. The forward type bonds are often issued by commodity producers for risk hedging.

The second type of commodity bond combines a conventional bond with commodity options. In this case, a holder of the bond owns the right to buy or sell a certain commodity at a certain exercise price in addition to a conventional bond. The option-type bonds are often used to lower the cost of financing by attaching long-term options written on a commodity.

Commodity linked bonds are useful for producer governments because they are long term. But since most are for periods exceeding five years or more, and some have been done for up to ten years in certain energy-producing nations, they are not suited for soft commodity or grain markets, The bonds themselves can help to create secondary financial market instruments in the issuing countries, they can assist in reducing debt service default rates during inflationary periods because the income stream is predicated in commodity receipts, which should rise during such periods.

The disadvantages of the commodity linked bond is that they require a fairly sophisticated distribution network to market them. It does a government no good to issue a bond that cannot be sold. Outside investors are needed to purchase these bonds and the key to strong sales is the coupon rate, which is a credit-driven issue.

Annex 2[1]

The Canadian National Tripartite Stabilization Program for Live Cattle

The National Tripartite Stabilization Programs (NTSP) were developed to provide livestock producers in Canada with a mechanism to stabilize incomes. The program was designed to pay participants when their actual profit margin from production was below the most recent five year average. The payment was equal to 90 to 95 percent of the difference between the actual current margin and this five year average. The NTSP consisted of separate cow-calf, feeder cattle, fed cattle, live hog and sheep programs.

NTSP was funded equally by producers, provincial treasuries and the federal treasury. Because of this arrangement, the payment to producers was considered by trading partners to be a subsidy equal to two thirds of the actual payment; consequently, it was a major source of trade friction.

The guaranteed profit margin provided by NTSP was the equivalent of a fund providing producer participants with a put option on their margin and charging them one third of the actual premium. The premiums paid into the fund were designed to keep the fund actuarially sound and were administered by a committee comprised of producers and federal and provincial representatives. There was, however, a difference between when payments occurred and when the funds were in a surplus situation. Consequently, the federal government was repeatedly called on to provide financing when the funds were in a deficit situation.

During 1992 and 1993 producer organizations and government agencies examined alternatives to the current program. The goal was to develop a program, or programs that were relatively neutral to the treasury, consistent with GATT, and did not interfere with the free market. One alternative examined was the use of options based on local cash markets.

The cattle industry in Canada was very eager to develop new support mechanisms that would not be a source of trade friction with the US because an extensive amount of Canadian production is exported to the United States. Consequently, research was launched to determine if options based upon US live cattle futures could be customized to satisfy the requirements of Canadian cattle producers.

Because there is a strong relationship between cattle prices and US-based live cattle futures converted into Canadian dollars, the US cattle futures could have been used by the Canadian cattle industry as a risk-hedging mechanism. However, there were a number of complexities that prevented this from developing in the private sector in Canada, including:

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[1] This annex was written by Al Proulx and Tom Scott, Sparks Companies, Inc.

- separate contracts would have been required for the cattle and the exchange rate instrument;

- there was a difference in scale between industry practices and the size of the futures contracts; and

- there was an absence of technical expertise in Canada for using futures to manage commodity price risk.

These complexities were addressed through the development of derivative instruments tailored to industry practices. For the cattle sector, the Agriculture and Agri-Food Canada has implemented a pilot program of put options (a currency-translated Chicago live cattle contract) written as wholesale over-the-counter-derivatives by a Canadian financial institution. Retail delivery has been through the Canadian Federal Farm Credit Corporation.

The cattle options pilot program (COPP) started in April 1995, and as of December 3, 1995 has been available to cattle producers in all the significant cattle production areas of Canada. Producers are covered in terms of underlying cattle price and currency risk but must cover basis on their own, since this is not hedgeable from the point of view of the put option writer. Producers are able to sell the put option back to the writer or hold their position until expiry. Only "out-of-the-money" strikes are offered on the four nearby contracts. The options offered are roughly one fifth the size of normal US live cattle futures.

As part of this program, extensive training covering virtually all commercial operations throughout the country was conducted to ensure that producers have some knowledge of the relatively sophisticated decisions they need to make to effectively use the put option.

Premium and strike price quotes are now carried by the two major agricultural data services on a live basis so producers can track daily movements of premiums and their underlying values, enabling them to make informed pricing decisions.

The instrument is being adopted relatively slowly with producers being very careful in assessing the value of the program. The strike prices being offered reflect the cyclical nature of the cattle industry. Both fat cattle and feeder prices have reached cyclical lows, forcing futures prices to levels that producers do not find attractive. These downwards trends, however, are indicative of the level of beef production expected in the near term. Coupled with dramatic increases in feed grain prices, it has been a challenge to provide strike prices that reflect attractive opportunities for hedging a profitable position.

The pilot is still very much a learning experience for producers and is of serious interest to commercial operators, who make up the greater portion of Canadian beef production, as opposed to smaller family farm operations with herds of fewer than 100 animals.

The intent of the program is to develop a body of experience that will enable the private sector being to offer similar programs price risk management programs on a commercial basis. There is some evidence that packers are now considering using this methodology in the form of a minimum price contract for physical delivery. Based on experience to date, the federal government has made the decision to continue the (COPP) program for 1996.

A somewhat different approach has been used for the Canadian hog industry. Since hogs have tended to be sold through provincial marketing boards on a pooled basis, producers have not thought in terms of price risk.

With the cooperation and startup funding of the Agriculture and Agri-Food Canada, a minimum price hog contract (MPHC) including basis has been offered to producers by one provincial marketing board. This contract differs from that for cattle in that the producer must hold the contract to expiry but can get the benefit of the higher contract or pool price at the time of marketing (physical delivery). The marketing board absorbs any basis gain or loss but takes a margin of the strikes offered to cover its basis exposure. The underlying put option (a currency-translated Chicago live hog contract sold on an over the counter within stringent pricing guidelines negotiated by Sparks Companies, Inc. on behalf of the marketing board) is written by a commercial banking institution. The marketing board itself acts as the retail agent. This contract became available in late October 1995. Producers have accepted the MPHC much more quickly than their counterparts in the cattle sector.

The instrument is starting to be used commercially and it is anticipated that this vehicle will be an integral part of a producers' price determination. The use of a fixed forward contract as an alternative, or on MPHC that can be converted to a fixed contract, is also being considered to provide the full range of pricing options under the difficult market conditions forecast for the next several years in the North American hog industry.

Since the producer-owned marketing boards are private sector operations (i.e., they do not receive government funding), the privatization goal of government is met directly through the hog sector initiative. Several financial institutions in Canada are now realizing the potential for using derivatives in the agricultural sector and are taking initiatives of their own to position themselves for this business.

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